Description of some larvæ of North American Coleoptera.

BY BARON R. OSTEN SACKEN.

The fourteen larvæ described in the sequel belong all (with the exception of *Fornax* and *Epilachna*), to genera the preparatory states of which have not, to my knowledge, been made known before. The most interesting among them are *Ptilodactyla*, the discovery of which will probably contribute to establish the true location of this genus in the system; *Zenoa*, belonging to the interesting family of *Rhipiceridæ*; *Parandra*, a genus forming the extreme limit of the extensive family of *Longicorns*, and the three unknown larvæ, which, after the discovery of their imagos, will add an entirely new form to the system of coleopterous larvæ.

The larvæ of *Ptilodactyla*, *Fornax badius*, *Parandra*, *Arhopalus* and *Centronopus* were discovered by Dr. Horn in Philadelphia, to whose kind communication I am indebted for them.

Zenoa and *Prionocyphon* were found by Benj. D. Walsh, Esq., Rock Island, Illinois.

Copris carolina, *Pseudocerus* and *Epilachna* were reared by myself.

Of the three unknown larvæ two species were found among alcoholic specimens of coleoptera from the southern parts of this country and the third was discovered by Dr. Horn.

All the specimens described had been preserved in alcohol.

COPRIS CAROLINA Linn.

(Plate 1. Fig. 1.)

The larva has the general appearance of all the larvæ of *Lamellicorns*, only the curved or doubled shape, peculiar to them, is more striking here than in any other, the ventral segments of the abdomen being considerably contracted, whereas the dorsal ones are very convex and distended into a hump-like expansion, through which the contents of the intestinal canal can be seen.

The length of the larva, if measured along the curved axis of the body, is about two inches; its color, a dirty yellowish-white; the skin is glabrous, except a few scattered hairs.

Head rounded, brownish-yellow with darker spots; vertex convex, with an impressed line, emitting two, less distinct branches, in the middle; front flattened; epistoma trapezoidal, with an impression each side; *labrum* short, transverse, narrowed at the base, bisinuated anteriorly and beset with short, erect bristles; *antennæ* 4-jointed, about as long as epistoma and labrum taken together, inserted on a tubercle, which might almost be taken for a

fifth joint; joints cylindrical; the first a little longer than the second; second and third of the same length; fourth joint short, slender, attenuated at the tip, inserted at an angle to the axis of the antenna; *mandibles* horny, very strong, with three blunt denticulations at the tip; their stout basal portion emits a strong tooth, concealed inside of the mouth (this is the description of the *left* mandible; the *right* mandible of my specimen seems to be more worn, as it has neither denticulations at the tip, nor an inner tooth); *maxillæ*: stout cardinal piece, placed obliquely; basal piece elongated, subcylindrical, horny; it bears two lobes; the outside one, close by the palpus is coriaceous, elongated, beset with stiff bristles and ends in a blunt point, directed upwards (towards the labrum); the inner lobe (concealed inside of the mouth), is shorter and ends in a strong, horny, curved point; it has some bristles on the inside, near the base; maxillary palpi 4-jointed; joints short, subcylindrical; second joint a little longer than the third; last joint likewise longer, pointed; *mentum* quadrangular, somewhat narrowed at the base; palpigerous piece transverse, rounded on the sides, excised in the middle and beset with bristles; labial palpi 2-jointed; first joint short, stout, tuberculiform; second joint small, narrow, almost rudimentary.

Thoracic segments narrower than those of the remainder of the body; the first with a horny, almost square piece on each side of the back and with a few scattered hairs; *the feet* with a few scattered hairs: coxæ cylindrical, elongated, but little shorter than the remainder of the foot; femora and tibiæ almost soldered together, a vestige of a joint being perceptible only on the upper side; the first are subcylindrical, the latter incrassated at the base, attenuated at the tip, which is crowned with a few minute bristles, and two longer hairs, evidently representing rudiments of ungues.

Abdomen very convex, bag-like on its back, glabrous, with the exception of a few scattered hairs; dorsal segments with transverse folds in the middle; under the anal aperture there is a semicircular, coriaceous piece, densely covered with short bristles, except in the middle, which is smooth and shining; it probably aids the larva in its motions.

Each larva was found enclosed in a globular case of dung or earthy matter, about an inch and a quarter in diameter. Early in spring, I found these cases imbedded in the sand on the banks of the Potomac. The larvæ underwent their transformation in confinement in the course of the summer, and although the pupæ died before the exclusion of the perfect insect, their form proved without any possible doubt that they were *Copris carolina*.

This larva shows a decided analogy with those of *Onthophagus* (Mulsant, Lamellicornes, p. 104, tab. I, fig. 5) and *Canthon colvens* (Candèze, Hist. des Métam. de quelques larves exotiques, tab. II, fig. 2), with the following differences: it is much stouter than both, especially than *Canthon*; it has no vestige of a hairy protuberance on the back, like *Onthophagus*; its labrum is less distinctly three-lobed.

ZENOA PICEA Beauv.
(Plate 1. Fig. 2.)

Larva resembling those of the *Elateridæ* or *Tenebrionidæ* in general appearance; cylindrical, the head being almost of the same breadth as the body, substance hard, horny, more or less dark brown; length, a little more than an inch.

Head stout, rounded, almost subglobular, inserted in the first thoracic segment, so that the front and the occiput above and a part of the gula below, are not covered by this segment. Front and occiput are deeply punctate; the latter has a short, longitudinal furrow in the middle; gula submembranaceous. Oral opening wide; its upper border somewhat reflexed, incrassated; its lower border, enclosing the maxillæ and the under lip, is cut out square, but does not reach the border of the thorax.

Labrum transverse, horny, jagged anteriorly, very uneven on its surface, showing deep punctures, placed in a row posteriorly, a depression before them, and many wrinkles on their intervals.

Antennæ rudimentary, apparently retractile, as they seem to be represented by two short tubercles, ending in a bristle, and projecting from a pit visible on each side of the head, on the oral border.

Ocelli not apparent.

Mandibles small, horny, strong, subpyramidal, ending in three teeth, the intermediate being the largest; the furrows, forming the intervals of these teeth, run some distance down the outside of the mandible; there is an excavation between them. This pair of organs is concealed deeply within the oral opening and cannot be distinctly seen, unless the mouth is dissected.

Maxillæ: a rather large cardinal piece, connate with the mentum; a basal piece, which is more than twice broader than it is long; a small, almost horny, suboblong, lamelliform lobe, rounded at the tip and bristly on the inside, and a second, still smaller, inner lobe, inserted below the first and closely applied to it; it is also beset with bristles and is concealed from view by the labium; maxillary palpi short, conical, 4-jointed; the first joint, although the longest, is still broader than long; the other joints

short, transverse; the last pointed.

The labium consists firstly, of a triangular or heart-shaped mentum, enclosed between, and connate with the cardinal pieces of the maxillæ; a fine impressed line indicates their suture; secondly, of a short, transverse, palpigerous piece, bearing on each side a short, 2-jointed palpus, with a stout basal and small narrow terminal joint; thirdly, of a large horny piece, situated behind the latter one, and occupying the whole width between the lobes of the maxillæ. It is bisinuated anteriorly and as it projects above the palpi, the latter are very indistinct, and appear concealed in an excavation.

First thoracic segment but little longer than broad, deeply punctate, like the head; a transverse furrow, running near by, but somewhat obliquely to, the anterior border, separates anteriorly a narrow, densely striate band, which is broader on both sides than in the middle; a second transverse, but less definite furrow runs from the middle of the back, where it is almost obsolete, down both sides, reaching the first furrow on the underside of the body.

Second and third thoracic segments transverse, almost three times broader than long, deeply punctate, like the first. The stigma is placed on each side near the anterior margin of the mesothorax.

Feet inserted in a depression on the underside of the thorax; they are very short, approximated at their bases and consist, besides the coxa, of three short, stout joints, the last of which ends in a strong unguis.

Abdominal segments, eight in number, cylindrical, broader than long, perfectly annular, as there is no visible suture on the sides or below, separating the ventral from the dorsal segments. The dorsum is punctate, but more sparsely than the thorax; the venter is smooth, except at the posterior margins of the segments, which are finely striate. The eighth segment is punctate all round, and more densely than the others. The posterior part of this segment is obliquely truncate and is closed posteriorly by a round, flat, horny piece, punctate on the outside and which can, to a certain extent, be opened and closed like a lid, being connected by a hinge superiorly and an expanding membrane inferiorly. This lid is to be considered as the ninth segment of the abdomen.

The segments 2—7 of the abdomen, have each, on the dorsal side, near the anterior margin, a pair of deep pits, somewhat angular anteriorly.

The eighth segment has, on the same place as the pits of the previous segments, a pair of short, oblique grooves, running towards the anterior incisure and finely striated at the bottom. The presence of eight pairs of abdominal stigmata is indicated by small, round, smooth discs or depressions, with elevated margin, situated on both sides of the body, on the

same line with the thoracic stigma. Between each pit and the stigma of the same segment, a small excavation, finely striated at the bottom, is perceptible close by the incisure, the anterior portion of this excavation being covered by the posterior margin of the previous segment.

This larva was communicated to Dr. LeConte by Benj. D. Walsh Esq., in Rock Island, Ill., as being probably that of *Zenoa picea*. He had found it under bark, in Southern Illinois, together with the perfect insect.

Mr. Candèze in his recent pamphlet (Hist. des métam. de qlq. larves exot. 1861) describes a larva from Ceylon, which shows the closest resemblance to the above described one. But Mr. Candèze's larva was sent to him as that of an elaterideous insect, *Campsosternus Templetonii*.

Dr. John L. LeConte, to whom I communicated my doubts on this subject, informed me that a clerical error had probably been committed in regard to "*Campsosternus*" as there is a *Callirhipis Templetonii* from Ceylon, which genus is next to *Zenoa*. Thus there can be no other doubt, I think, about the family to which both larvæ belong.

The differences between these larvæ are immaterial. An ocellus on each side of the head was distinctly seen on the larva from Ceylon; I could not perceive any on mine; besides, the antennæ of my larva are shorter, but, as they seem to be retractile, this shortness may be only apparent.

But I differ from Mr. Candèze in the interpretation of the two rows of pits on the abdominal segments of the larva. He takes them for stigmata and says, in accordance with this supposition, that the larva has the abnormal number of *six* pairs of stigmata on the abdominal segments and *none* on the thorax. My larva shows, as stated above, the normal arrangement of these organs: a pair on the thorax and eight pairs on the abdomen.

These stigmata, although very small, are quite distinct and placed on each side below the row of dorsal pits. With a strong lens, a double slit may be seen at the bottom of each. Mr. Candèze mentions "small depressions with an elevated margin and smooth bottom" which he perceived on each side of the anterior abdominal segments, below the pits, and which were obliterated on the posterior segments. May they not be the true stigmata?

PTILODACTYLA ELATERINA Illig.

(Plate 1. Fig. 3.)

Larva 0.35—04 long, cylindrical above, venter flattened; head and thorax a little broader than the remaining segments; consistency horny on the dorsal segments, softer on the ventral ones; head and thorax horny, reddish-brown; dorsal segments yellowish-brown, venter paler; the body

is beset with numerous, although not dense, long, erect hairs, forming transverse rows on the dorsal side.

Head horizontal, rather short, rounded, somewhat stout, inserted in the prothorax, a transverse portion of the front, not much longer than the projecting parts of the mouth (including the epistoma), remaining uncoverd; *antennæ* inserted on the sides of the head, a little shorter than the breadth of the labrum, 4-jointed, basal joint very short, transverse, more than twice broader than long, second joint subcylindrical, less than twice longer than broad, third joint cylindrical, about the same length with the third, but much narrower, obliquely truncated at the tip; the fourth joint is represented by two minute, short articles, closely applied to each other and inserted in the truncature of the third joint; a black spot on each side of the head, close behind the antennæ, may foreshadow the appearance of ocelli, which are not otherwise perceptible; front irregularly wrinkled, epistoma short, transverse, its posterior suture very distinct, straight in the middle, slightly oblique on both sides; *labrum* transverse, not longer and a little narrower than the epistoma, horny, its anterior margin nearly straight, slightly recurved in the middle, so as to form a distinctly elevated edge; its surface has two minute impressed points, with a hair inserted on each; *mandibles* horny, stout, slightly arcuated exteriorly and hollowed out on the inside, with three blunt teeth at the tip; unless removed, they are concealed inside of the mouth and do not project beyond the labrum; *maxillæ:* a short, oblique cardinal piece; a broad, coriaceous basal piece; two lobes of the same consistency; the inner one narrow, short-lanceolate, pointed at tip, with six or seven stout bristles on the inside; the other, inserted between the first and the palpus, and separated from the basal piece by a distinct suture, is also coriaceous, rounded at tip, on the inner side of which a palpiform, subcylindrical, stout joint, pointing inside, is inserted; three stout bristles are placed immediately behind it; maxillary palpi 4-jointed, conical, joints of about equal length, diminishing in breadth; *mentum* large, flat, disclike, broader than long, rounded on the sides, partly concealing the basis of the maxillæ; palpigerous piece horny, broad, with a bisinuated projection in the middle, between the palpi, which are 2-jointed, short.

Prothorax as long as it is broad, with numerous transverse wrinkles on its anterior half, more smooth posteriorly; laterally it is bent on both sides towards the pectus, so as to be convex above and concave below; its lateral edges are sharp and project over the basis of the coxæ; its anterior and posterior margins above are straight; the lateral ones slightly rounded; the angles are also rounded; its anterior portion below is a triangular skin,

covering the basis of the head. *The second and third* segments of the *thorax* as well as eight segments of the *abdomen* are nearly of the same length, short, transverse, smooth, except some indistinct punctures in which the hairs are inserted, especially a row of them near the posterior margin.

These segments are bent on both sides towards the venter, so that the sutures between them and the latter are on the underside of the body.

Ninth or *last segment* of the abdomen convex above, rounded posteriorly, projecting beyond its ventral side, which has a large, fleshy tubercle (pseudopod), with a fissure in the middle.

A longitudinal impressed line is visible on the posterior part of the prothorax and on the three following segments.

The feet have the usual structure: a large oblique coxa, a distinct, sublanceolate trochanter, a stout, short femur, a narrower tibia ending in a horny unguis; the inside of the femora is lined with a few short bristles.

The stigmata are perhaps concealed within one of the ventral furrows, as notwithstanding my repeated efforts I did not succeed in finding them.

The pupa has two bristles, inserted at some distance from each other, near the anterior margin of the prothorax; two similar bristles close before the root of the wings; the abdomen is conical, beset with fine hairs on the margins of the segments; its tip is bifid.

Dr. George H. Horn who kindly communicated to me this larva, makes the following statement about its discovery (Proc. Ent. Soc. Phila. 1861. p. 29), "One specimen of the perfect insect and many pupæ, together "with one larva, were taken by myself. They were all found in one log, "which was rather moist and rotten, its texture being so destroyed that "it was impossible to distinguish the species, though it was probably an "oak. The pupæ were concealed by a thin layer of wood, and were on "the side adjacent the earth. The identity of the pupæ was established "by raising several, and by means of the cast larva skin, which adhered "to a pupa, I was enabled to identify the larva."

Although this insect is placed in the same family with *Cyphon*, it is difficult to discover any points of resemblance between the larvæ of both.

The general appearance, the mode of life and the details of the structure are totally different. The long antennæ and maxillary palpi, the large labrum, excised anteriorly, the depressed, oniscifform appearance of the larva of *Cyphon* (and *Prionocyphon*), are replaced here by short antennæ and palpi, a short, transverse labrum, almost entire anteriorly, and a cylindrical body, reminding in form and consistence of the larvæ of *Elateridæ*. The mentum is rather broad in both genera; still it is much larger in *Cyphon*, where it occupies the greater part of the underside of

the head; its labial palpi are remarkably distant from each other, whereas they are approximated in the larva of *Ptilodactyla*. It may be that the larva of *Atopa*, if better known, would show more relationship to the latter; but the details given in the only description (without figure) which is extant (Erichs. Wiegm. Arch. 1841, p. 88 and Chap. & Candèze, l. c. p. 492) seem rather to justify an opposite conclusion. Antennæ, epistoma, labrum, mandibles, maxillæ etc., of the larva of *Atopa* seem to be different. Its head is perpendicular, as in the Lamellicorn larvæ, and not horizontal.

It would be difficult at present to point out any other relationship of the larva of *Ptilodactyla*; that to the *Elaterid*æ is merely confined to some analogy in the general appearance; the differences are very considerable.

FORNAX BADIUS Mels.

(Plate I. Fig. 4.)

The first larva of *Fornax* was described and figured by Mr. Coquerel in the *Annales de la Soc. Entom.* Vol. IV, 3e Série, 1856. It came from Madagascar. The larva of the American species, kindly communicated to me by Dr. Horn in Philadelphia, agrees with that of Mr. Coquerel in all the principal characters, especially the singular structure of the head.

The larva of *F. badius* is 0.83 long, linear, flat, slightly coarctate at the incisures; its consistence is tough, its color (except the head and some horny spots on the body), yellowish; it has no feet. Examined under a strong lens, the skin of the larva appears finely striate.

The head is semi-elliptical, flat, horny, dark brown in the middle, reddish-brown on the sides; its sharp margins are serrated as follows: in the middle, anteriorly, there is a small excision with two minute projections, or teeth, on each side; behind them, six larger teeth may be counted on each side, the last of which is the largest and is preceded by a deeper excision. The interpretation of these teeth, as parts of the mouth, is not without difficulty. The two pairs of minute projections on the anterior part of the head, if viewed from below, appear separated from the lower cephalic plate by a stout, bisinuated suture and may, perhaps, be taken for the underlip. In the interval between the first and second lateral teeth a very minute, 2-jointed, palpiform organ, with a similar, 1-jointed organ close by it, on the inner side, are perceptible. They project from a perforation in the horny substance of the head and seem to be retractile, as they are not visible in some specimens. I incline to take the one for the maxillary palpus and the other for the inner lobe of the maxilla. The lateral teeth 2—4, seen from below, appear separated by a suture. This

piece may be the mandible. Finally the last and largest lateral tooth I would consider as the lateral angle of the cephalic shell and the place where the antenna, of which not a rudiment however is perceptible here, is generally inserted. (Mr. Coquerel considers this last tooth as the mandible.) Thus, the mandibles seem to be closely connate with the cephalic shell and not susceptible of any independent motion. The oral opening is only a small transverse slit on the anterior sharp edge of the head. Except the above mentioned sutures on the underside, the surface of the head is perfectly smooth and shining, above and below. No ocelli are discernible.

The two first thoracic segments are longer, broader, and somewhat stouter than the abdominal ones; the first is a little narrowed anteriorly, the second almost square; the third segment is transverse, but little broader than the abdominal ones, and exactly like them in shape. The first segment of the thorax has, on each side, laterally, a brown, horny, polished spot; it has, besides, in the middle of the dorsal, as well as of the ventral side, two similar spots, having the shape of an inverted comma, and deeply striated on their broader end; they are placed longitudinally, parallel to each other; the space between them is occupied by a square, opaque spot of a velvety appearance.

The *second* thoracic segment has, on its dorsal side, two pale brown, horny, elongated, closely approximated, deeply striated spots, enclosed in a horse-shoe-shaped, opaque, velvety band; the ventral side of the segment has exactly the same structure, only the two striated spots coalesce here in one. The thoracic stigmata, placed on the sides of this segment, are very distinct.

The abdominal segments are nine in number; the three first are transverse, broader than they are long; the following are somewhat longer, so that the sixth, seventh and eighth are almost square; each of the segments, except the ninth, has a pair of distinct stigmata placed on the sides, close under the margin of the preceding segment. The four anterior ones have, near the anterior margin, a narrow, opaque, velvety band and behind this band, a small, horny, transverse streak of undefined outline, covered with fine longitudinal striæ. The four following segments have, instead of the velvety band, a larger, triangular or semicircular spot of the same nature.

The ventral side shows exactly the same structure. All the velvety spots show in a certain light, a golden, sericeous reflection.

The ninth or last segment of the abdomen is a little broader, although not longer, than the preceding ones, rounded at the tip; its basal portion is of the same color and consistence with the other segments; its tip is

brown, horny and punctate. On the dorsal side, at the basis, this segment has a semicircular, velvety spot, like the preceding segments. On the ventral side it has a semicircular excavation with a finely denticulated anterior (arcuated) margin, a finely granulated bottom, and a posterior (straight) margin, indicated by a row of short, rude, longitudinal furrows. A short longitudinal groove may be seen, besides, among the granules of the bottom; it is evidently the anus.

There is no distinct suture between the dorsal and ventral segments, neither on the thorax, nor on the abdomen.

This larva resembles in every respect that described by Mr. Coquerel, except that he counted eight abdominal segments, instead of the normal number of nine, which admits of no doubt in my specimens. A slight difference is also observable in the shape of the horny, striated spots of the first thoracic segment; in the larva from Madagascar, their anterior end is broader than the posterior one. Mr. Coquerel differs besides from me in the interpretation of certain parts of the head; he does not mention the minute palpiform projections and considers as mandibles, what I take to be the lateral corners of the cephalic shell, which, in normally organized larvæ, are the places of insertion of the antennæ. My supposition is strengthened by the comparison of the larva of *Melasis*, where the antennæ are developed.

The pupa of *F. badius* is 0.35 long, elongated, pale yellowish, with sparse hairs and bristles on the head and hairy tufts at the tip of the body. (See Coquerel's figure, l. c. Tab. XV, fig. 3 K.)

The flat, sharp-edged, denticulated head of the larva of *Fornax* with its connate parts of the mouth, apparently capable only of almost imperceptible motions, and the small oral opening, render it very probable, in my opinion, that these larvæ pierce the skin of other wood-boring larvæ and suck the contents of their body. In this respect they would only resemble their congeners, the Elaterideous larvæ, some of which are known to be predaceous.

Dr. Horn found numerous larvæ and pupæ in June, in the stumps of oak trees undergoing a state of dry decay. When about to assume the pupa state, the larva becomes doubled upon itself, U-shaped. The pupa state lasts two weeks. (See Proc. Entom. Soc. Phila. 1861, p. 43.)

FORNAX ORCHESIDES Newm. (?)

(Plate 1. Fig. 5.)

Since I obtained from Dr. Horn the previous larva, I easily recognized as a *Fornax* an undetermined larva of my collection, which I had found

several years ago near Berkeley Springs in Virginia. As it is about an inch and a fifth long, it must be that of the largest species of the genus, *Fornax orchesides* (or, perhaps *F. bicolor?*).

It agrees with the larva of *F. badius* in all important characters, so that it will be sufficient here to point out the differences.

The head is somewhat broader anteriorly and the lateral pieces (mandibles?) are three and not four-toothed as in the other larvæ. The surface of the head above is sparsely punctate. The palpiform projections, although minute, are discernible.

The first thoracic segment is twice broader than long, narrowed anteriorly, rounded on the sides; its substance is almost horny, reddish-brown; the surface is punctate, with a longitudinal groove on each side, two triangular, darker spots in the middle, especially apparent on the ventral side, and a triangular, sericeous spot between them, near the posterior margin; this spot is broader on the ventral than on the dorsal side.

The two following thoracic and the *abdominal segments*, except the last, are covered, above and below, with dense longitudinal striæ. Near the anterior margin of each, in the middle, there is a sericeous spot, which is round on all segments, on the dorsal as well as on the ventral side, except on the second thoracic segment above, where it is tridentate, and on the second and third thoracic segments below, where it is reversed truncated heart-shaped.

The last abdominal segment is of a more horny consistence, deeply punctate, hollowed out below. In the middle of the underside there are the same granulations as in the former larva, arranged in concentric rows, round a furrow in the middle. The basis of the same side has deep longitudinal furrows. The truncated posterior margin of the segment shows two minute, oblique, horny points.

As to the proportions of the segments, the thoracic ones are broader than long, the abdominal ones almost square, except two or three intermediate ones, which are a little longer than broad and somewhat narrowed at both ends; the last segment is longer than broad, suboval.

PRIONOCYPHON DISCOIDEUS Say.

Larva onisciform, elongated, flattened, with sharp lateral edges, slightly attenuated anteriorly and posteriorly; its consistence is coriaceous; its color a dull pale yellowish; its length 0.4.

Head rather large, about half so broad as the first thoracic segment; anterior margin of the upper cephalic plate almost straight, dividing the head transversely in two almost equal parts, the posterior of which com-

prises the broad, but short, front, with a group of black ocelli on each side; the anterior one showing the upper surface of the parts of the mouth.

Antennæ, inserted immediately before the ocelli, almost half so long as the body, setaceous; they have two cylindrical basal joints, the second longer than the first; the remainder of the antenna is very slender, gradually attenuated towards the tip and consisting of numerous short joints, of which more than 150 can be counted.

No distinct epistoma; *labrum* occupying only one third of the breadth of the head, nearly as broad as it is long, narrowed posteriorly, rounded on the sides, and with a broad excision anteriorly; it bears several bristles.

Mandibles stout at the base, attenuated towards the tip, which is pointed; arcuated on the outside and slightly excavated on the inside; their direction being nearly parallel to the longitudinal axis of the body, they do not cross nor touch each other; their color is pale, brown only at tip.

Maxillæ elongated, fleshy, ending in a coriaceous, yellowish-brown lobe, ciliated on the margin; an oblique brown suture runs from that lobe down a part of the maxilla, thus separating a narrow piece on which the palpus is inserted; the latter placed on a cylindrical basal tubercle, resembling a fifth joint, elongated, almost longer than the maxilla, 4-jointed; joints cylindrical, slender; the first is the longest; the second and third of equal length, shorter than the first; the fourth still shorter and more slender.

Underlip very large, covering a considerable portion of the underside of the head. It consists firstly of a trapezoidal basal piece, immediately adjoining the anterior margin of the thorax; secondly of a large, rounded, cushion-like piece, on the anterior sides of which the palpi are inserted; the latter are 2-jointed and unusually distant from each other; thirdly of a lingua, slightly projecting from behind the latter piece and ending in three stout bristles.

First thoracic segment elliptical, convex and smooth above, twice broader than long, its sides rounded, lined with a few bristles; its anterior angles hardly indicated. *Second* and *third segments* transverse, shorter than the first, but of the same breadth; smooth above, somewhat rounded and ciliated on the sides. These three dorsal segments project considerably beyond the ventral ones.

The feet are rather long; coxæ large, placed obliquely inwards, those of each pair touching each other at the tips; femora and tibiæ cylindrical, clothed with short bristles; ungues slender, elongated, spinose about the middle.

Abdomen with eight dorsal and nine ventral segments; smooth and convex above and below; lateral edges sharp, clothed with soft hairs; segments

short, nearly of the same length; their breadth is that of the last thoracic segment; the posterior ones however, are somewhat attenuated; the last dorsal segment is trapezoidal, longer than the preceding; its posterior margin is sinuated.

An almost imperceptible longitudinal impressed line runs along the middle of the dorsal side of the body, on the thoracic and abdominal segments.

This larva shares all the striking characters of the larvæ of *Cyphon*, as characterized by Erichson (see Chapuis & Candèze, Catalogue des larves etc. p. 493, tab. V, fig. 5); the long antennæ, the rounded labrum, excised anteriorly, the long maxillary palpi, the large labium, with the labial palpi very distant from each other etc., are common to both. If my description of the lingua and the maxillæ is less detailed than that of this author, it is merely because, having only a single specimen for examination, I did not like to dissect it. No more than Erichson did I perceive any vestiges of stigmata.

The differences which I observe consist in the form of the head, which, in my specimen, is less expanded behind the antennæ and in the more considerable length of the latter.

To the discoverer of the larva, Benj. D. Walsh Esq., in Rock Island, Ill., I am indebted for the following notice about its habits:—

"The larvæ of *Prionocyphon discoideus* Say, occurred abundantly of various sizes about the end of May in the hollow of an oak stump containing a gallon or two of water. Some were in the decayed wood which formed the walls of the hollow, but most of them were attached to pieces of loose wood and bark which lay at the bottom of the water. The pupæ appeared to be found only in the walls of the hollow.

"On the 7th of June, having given a fresh supply of the coffee-colored water from the stump to a number of these larvæ, which I had placed in a glass jar, I noticed them beneath the surface of the water vibrating vigorously up and down a pencil of hairs proceeding from a horizontal slit in the tail. This pencil appeared to be about the length of four abdominal segments; and on a subsequent occasion, one of the larvæ having suspended operations for a second or two, I was able to see, with the assistance of a double lens magnifying about four diameters, that the pencil was composed of three pair of filaments, each beautifully bipectinate. I presume it is used to extract air from the water.

"When at the surface this larva generally, but not always, swims on its back, keeping its body slightly below the surface and striking with its feet, so as to jerk from point to point in a curved line. The pencil of

"hairs touches the surface all the time, being apparently not over one or "one and a half millimetres in length, and obscurely developed when com- "pared with the view obtained on June 7th under the surface of the water.

"Occasionally a bubble of air is discharged from the tail. Generally, "when it is beneath the surface, the anal pencil is retracted entirely. It "has the power of jerking its body suddenly round, and darting up and "down with great vigor. Its remarkably long antennæ are constantly vi- "brating, like those of terrestrial insects. Its general habit is to crawl "on decayed wood beneath the surface, occasionally swimming to the sur- "face, probably for a fresh supply of air.

"The pupa is white, with large black eyes which are very conspicuous "beneath, and two short black setæ on the occiput. The body is covered "with a short, white, erect down or pubescence. The antennæ are about "two-thirds the length of the body, placed lengthways beneath, side by "side. The body is scarcely .2 inch. long.

"The imago occurred at the same time as the larva, in profusion, in the "rotten walls of the hollow. I found none in my breeding jar after June "7th. From about June 14th to July 21st I was absent from home. On "August 7th I examined the jar, and found eight or ten larvæ in it, but "no pupæ or imagos.

"The stump whence they were obtained, supplied many additional lar- "væ, but none have since developed into the imago state. Hence I con- "clude that this insect is not double-brooded."

PARANDRA BRUNNEA Fabr.

(Plate 1. Fig. 6.)

The longicorn larvæ are remarkable for the great uniformity of their general appearance and structure and although a considerable number of them have been described, the characters distinguishing the larvæ of the different groups of this family have not, as yet, been sufficiently defined.

All that we know about these characters is contained in the following passage of Erichson (Wiegm. Archiv. 1842. p. 376): "Notwithstanding "the great similitude between the larvæ of Longicorns, some important "differences in the structure of those belonging to the four divisions of "this family may be noticed. The larvæ of the *Lamiida* differ more than "the others, on account of the total absence of feet and the position of "the first pair of stigmata which is placed in the fold between pro- and "mesothoracic segments, less abruptly separated than the others. The "other larvæ have this first pair on the sides of the mesothorax, and have

"feet, which however are sometimes so small, as to be perceptible only "when magnified, even in large sized larvæ. The *Cerambycidæ*, (*Ce-* "*ramby.r*, *Callidium*,) have on the posterior side of the prothorax, above "and below, a fleshy, transverse fold, separated by a furrow from the "horny disc of this segment; in the *Prionidæ* and *Lepturidæ*, the same "fold is visible only on the underside. The *Lepturæ* have a large, flatten- "ed head, as broad as the prothorax, whereas in the other longicorn "larvæ the head is small and much narrower than the thorax. The larvæ "of *Prionidæ* show the least differences from those of the *Lepturidæ*, and "that of *Spondylis* is remarkably allied to the latter."

These characters, if used for the determination of larvæ will be found useful, but not in all cases exhaustive. The position of the mesothoracic stigmata, for instance, is frequently such that it is difficult to decide whether they belong to the mesothorax itself, or to the fold between it and the prothorax. The absence of feet seems to be a good character of the *Lamiidæ*; that exceptions occur, however, is proved by the larvæ of *Arhopalus*, which has no feet, although belonging to the *Cerambycidæ*.

A striking instance of the uniformity of structure which prevails among the longicorn larvæ is afforded by that of *Parandra*. This genus is located on the extreme limit of the family; the appearance of the perfect insect is so different from that of the other longicorns that one might be tempted to suspect, that its location among them was unnatural. Nevertheless, its larva is a true longicorn larva, and could not possibly be mistaken for anything else. The general appearance, the structure of the head and mouth, the large development of the prothorax, with its horny disc above and below, the fleshy protuberances along the back and the venter, the Y-shaped anal opening, etc., this larva has in common with all the others of the family. The size of the head, the presence of feet, the fleshy fold on the posterior ventral margin of the prothorax, the position of the first pair of stigmata, and the development of the ninth abdominal segment, the anal portion of which, usually separated by a fold in longicorn larvæ, is very small here, are so many indications of its relationship to the *Prionidæ*.

Length about an inch.

Head large, not much narrower than the prothorax, inserted in it for more than one half of its length; when extracted its appears heart-shaped; a longitudinal suture runs in the middle, above and below; the excision between the posterior rounded lobes is filled up with a fleshy substance forming the connection of the head with the prothorax. Its color is yellowish, except the margins of the oral opening, which are brownish.

Epistoma trapezoidal; its anterior angles rounded. *Labrum* longer than broad, narrowed at the base, broadest before the middle and again narrowed towards the tip, which is truncated and beset with golden pubescence. *Mandibles* very stout at the base, pointed at tip, almost pyramidal; they have no indentations; they are but little excavated on the inside and their tip is but very slightly curved. *Maxillæ:* stout cardinal piece, short, transverse basal piece, a small, coriaceous, bristly lobe, and a 3-jointed palpus, projecting beyond this lobe. *Mentum* transverse, rounded on the sides; palpigerous piece small, bilobed, each lobe bearing a short, 2-jointed palpus; *lingua* very much developed, prolonged inside of the mouth and consisting of two coriaceous lobes, pubescent along the margins and connate on their flat surfaces, the margins only remaining free (this can be perceived only by dissection). *Antennæ* short, apparently 4-jointed; first joint the largest, second joint as if immersed or retractile in the first, third but little longer, fourth minute and narrow.

Prothorax yellowish, brown on the anterior margin; its underside shows three triangular pieces separated by distinct sutures; at the posterior corners of the middle one the feet are inserted on a pair of fleshy tubercles; each side of the prothorax has also a triangular, elongated piece, placed between the ventral and the dorsal horny plate; the latter is flat on the back and recurved almost at right angles on the sides, so as to encroach considerably on the lateral sides of the prothorax; its dorsal disc is limited on both sides by a longitudinal fold, tinged with brown, beginning at the posterior margin, but not quite reaching the anterior one; the anterior portion of this dorsal disc is smooth, the posterior one covered with fine, brown, granulations more extended anteriorly in the middle than on the sides; the posterior margin of this disc is abrupt, steep and smooth. The middle triangle of the breast-plate has the same granulations on its posterior half; they are also extended to a portion of the lateral triangles.

The *two other thoracic segments* are short, wrinkled; on the underside, between the feet of each pair, two oblique wrinkles, connected by a transverse furrow, may be observed. The feet are short and consist of a fleshy, tubercular coxa, a short femur and tibia and an elongated nail. The first pair of stigmata is placed on the sides of the mesothorax.

The seven first *abdominal segments* have each, on the dorsal, as well as the ventral side a fleshy protuberance, which is oblong on two or three anterior segments and more rounded on the others; being divided longitudinally by a deep furrow, these protuberances appear double; they have besides, especially those on the anterior segments, a more or less distinct transverse furrow and a pair of oblique wrinkles on the sides. The eighth

and ninth segments are smooth above and below. The anterior segments are the shortest; the following gradually increase in length; the ninth is the longest; its anal tubercle is small, divided into three lobes by a Y-shaped furrow; a few hairs are inserted around it. Number and position of the abdominal stigmata are normal.

Dr. Horn, to whom I am indebted for the communication of these larvæ, found them in different kinds of decaying wood, especially beech wood, which they seem to prefer. (See Proc. Entom. Soc. Phila. I, p. 73.)

ARHOPALUS PICTUS Drury. (robiniæ *Först.*)
(Plate 1. Fig. 7.)

Larva 0.6–0.7 long, somewhat flattened-club-shaped, the thoracic segments being considerably broader than the abdominal ones, but at the same time distinctly flattened above and below.

Head, when extracted from the thorax, appears almost circular and narrower than the prothorax; in its usual position, it is inserted in the latter, so that, besides the mouth, a very narrow portion only is visible. The exserted portion is brownish, the remainder yellow. *Antennæ* short, apparently retractile, as in some specimens only two joints are discernible, whereas in others four joints could be seen; the second joint seems to be retractile in the first; the fourth is rudimentary. The visible portion of the head above is irregularly wrinkled and marked with some punctures; below it has two short, parallel, longitudinal striæ on the gula. *Epistoma* distinct, small, trapezoidal; *labrum* suboval, almost as long as broad, narrowed at the base, broadest in the middle, narrowed again and ciliated at the tip. *Mandibles* very strong, horny, black, rounded at the tip, regularly convex on the outside; inside somewhat excavated and applying exactly with the broad, rounded tip, against the inside of the opposite mandible. *The maxillæ* and *the underlip* have the usual structure of these parts in longicorn larvæ, only the basal pieces are shorter than in the larva of *Parandra* and the *lingua* seems to be less developed.

The *prothorax* is twice broader than long, rounded anteriorly, flattened above and below, brownish-yellow, covered, especially on the sides and below, with a short, golden pubescence. The sutures of its component parts are by far not so distinct as in the preceding species. A deep, longitudinal, sinuated furrow is visible on each side; a short transverse furrow crosses its posterior end. The upper disc is enclosed between two furrows beginning at the posterior margin and not reaching the anterior one; a transverse furrow, parallel to the posterior margin separates a narrow fleshy fold. The anterior portion of this upper disc is irregularly punctured

and wrinkled, although shining; in some specimens it has an indistinct, elongated, somewhat oblique brownish spot on each side, about the middle; the posterior portion of the disc is opaque, covered with dense longitudinal wrinkles, among which a straight impressed line is apparent in the middle. The ventral side is irregularly punctured on the sides and has a depression in the middle which is less apparent in some specimens.

The *two other thoracic*, as well as the two first *abdominal segments*, have, above and below, a transverse, flattened opaque disc, limited on each side by a furrow, and showing some indistinct furrows on its surface; the other abdominal segments have the usual protuberances, on the dorsal as well as the ventral side, marked with wrinkles. The last segment is short and divided in two halves by a transverse fold; the latter half has the anal opening at the tip. All these segments are beset with short golden hairs on the sides. The distribution of the stigmata is normal.

The presence of a narrow, fleshy, fold on the posterior margin of the prothorax, above and below, is a character of the *Cerambycidæ*; but the absence of feet belongs to the larvæ of the *Lamiidæ*.

The larva usually occurs in the wood of the locust. Dr. Horn found it in the hickory. According to him "its excavations are immediately sub-"cortical; unlike the *Clytus*, its course is not in a line, but it bores in "every direction, making extensive excavations." (See Proc. Entom. Soc. Phila. I, p. 30.)

The pupa has numerous, pointed granulations on the prothorax; similar granulations ending in sharp points, are placed in a row on the dorsal segments of the abdomen, near the posterior margin; the same segments have, more anteriorly, a few similar sharp, horny projections. On the penultimate segments, these projections are larger and recurved anteriorly at the tip; there are six in a row near the posterior margin, and two others more anteriorly. The last segment has four similar projections in a row.

PSENOCERUS SUPERNOTATUS Say.

Larva about 0.3 long, subcylindrical or prismatical, pro- and mesothorax being a little broader than the other segments.

Head about half the breadth of the prothorax, reddish-yellow, brown along the oral margin, more reddish below. *Antennæ* very short (in my specimens, preserved in too strong alcohol, they seem to have contracted and are hardly visible). *Epistoma* trapezoidal. *Labrum* transverse, short, rounded anteriorly and ciliated with short hairs. *Mandibles* subconical, apparently not touching each other at their tips; the *maxillæ* and the *labium* seem to share the characters of the preceding larvæ.

The upper disc of the *prothorax*, limited on both sides by the usual two furrows, beginning at the posterior margin and not quite reaching the anterior one, is covered, on its anterior portion, by dense, parallel, longitudinal striæ; this portion (equal to about one-third of the length of the prothorax), is somewhat more convex than the remainder; the remaining two-thirds are more smooth and shining, irregularly and faintly wrinkled; close by the posterior margin, these wrinkles become more dense and also assume the shape of longitudinal, parallel striæ, which however are less deep than those of the anterior margin. The underside of the prothorax shows a triangular central disc, separated by more or less distinct furrows, and two triangular lateral discs (see *Parandra*). A transverse furrow near the posterior margin of the central triangle separates a fleshy transverse fold, which, in this genus is very large and distinct. The corresponding fold on the dorsal side is very narrow and much less distinct. The mesothoracic stigma is placed in the fold between pro- and mesothorax.

The two other *thoracic* and the *abdominal segments* are nearly of the same size and shape; only the former are a little broader. On the dorsal side, each of them, beginning with the last thoracic and ending with the seventh abdominal segment, has an oblong, transverse protuberance in the middle, marked on its surface with two transverse rows of small shining tubercles, especially apparent on the fifth, sixth and seventh segment; eight or ten tubercles may be counted in each row. The rows are convergent at both ends. Similar protuberances exist also on the ventral side; only, instead of eight, they are nine in number, as the mesothorax, which is smooth above, has a protuberance of this kind on the underside. The eighth and ninth abdominal segments are smooth; the anal portion of the ninth is distinctly separated.

The whole body is sparsely beset with fine golden hairs.

The absence of feet and the position of the thoracic stigmata indicate the position of this larva among the *Lamiidæ* of Erichson. I found them in winter, burrowing the stalk of a climbing plant, which may have been the grape vine, although I failed at that time to ascertain it positively. The perfect insect was reared from them the next spring.

CENTRONOPUS ANTHRACINUS Knoch.

Larva 0.8 long, cylindrical, yellowish-white, of a soft, fleshy consistence, naked, except a few sparse hairs on the head and still fewer on the body.

Head horizontal, yellowish (except the tip of the mandibles, which is brown), as broad as the prothorax, rounded, smooth and convex above,

flat below, sparsely beset with a few hairs on the sides and below; *epistoma* transverse, trapezoidal, pale anteriorly, separated from the front by a rectilinear suture; *labrum* transverse, as broad as the anterior, narrower portion of the epistoma, rounded at the anterior angles and beset with small hairs; *mandibles* horny, stout at the base, abruptly narrowed towards the tip and slightly curved interiorly; tip tridentate, the intermediate tooth being the largest; *maxillæ:* cardinal piece oblong, fleshy, obliquely directed inwards and closely applied to the basis of the mentum; basal piece elongated, subcylindrical, fleshy, forming a knee with the cardinal piece; maxillary lobe oblong, coriaceous, as long as the palpus, densely beset with hairs and spines on the inside and at the tip; maxillary palpi 3-jointed; first joint not longer than broad, second a little longer, subcylindrical, third as long as the first, but much narrower, attenuated at tip; *mentum* longer than broad, somewhat expanded about the middle; palpigerous piece transverse, short, bisinuated anteriorly; its lateral portions might be taken for the basal joint of the palpi, on account of their small size and rounded shape; the middle portion projects anteriorly between the palpi; its anterior, oval margin has several minute bristles; palpi 2-jointed; first subcylindrical, not much longer than broad; second joint shorter and narrower; *gula* marked with three longitudinal furrows, running towards a triangular piece which fills up a space between the basis of the maxillæ and mentum; *antennæ* a little shorter than the mandibles, 4-jointed; basal joint short, tuberculiform, second and third joints cylindrical, elongate, the latter shorter than the first; fourth joint very minute, much narrower than the third, still longer than broad, bearing an elongate hair at the tip; ocelli apparently none.

Thoracic segments smooth, of a somewhat harder consistence than the abdominal ones; the first is twice as long as each of the two others, convex above, with sharp edged lateral margins. Feet of moderate length; coxæ directed obliquely inwards, each of them touching at the tip the opposite one of the same pair; trochanters elongate, lanceolate at the tip; femora not much longer than the trochanter, subcylindrical, beset with a few bristles on the inside; tibæ a little longer, somewhat attenuated towards the tip; unguis stout and pale at the base, brown at tip.

The nine abdominal segments are of about equal length, fleshy, soft; the last segment ends in two short, unguiform, horny projections, directed upwards, which are pale at the base and brown at tip.

The *pupa* is yellowish-white; the sides of its abdominal segments are recurved upwards in the shape of two strong teeth, one of which points towards the head, the other towards the anus; inside of each of these

teeth is a smaller, tooth-like projection; at the tip of the abdomen there are two divergent spines.

Both larva and pupa of this insect are in perfect accordance with those of other *Tenebrionidæ*, and especially of the genus *Tenebrio*, except that the skin of the larva is of a softer substance than is generally the case in this family. Hardly any difference will be found, for instance, between my description of the parts of the mouth and that which Erichson gives of the larva of *Tenebrio molitor* (Chapuis & Candèze, l. c. p. 514). It remains, therefore to find out the generic differences of the larvæ by a close comparison of specimens, and not merely of descriptions.

Dr. Horn, who discovered this larva and communicated it to me, states (Proc. Ent. Soc. Phila. I, p. 30) that it inhabits black-oak stumps, and may be found in company with the larva of *C. calcaratus*.

EPILACHNA BOREALIS Muls.

Several larvæ of this genus having been described before, (see Chapuis & Candèze, l. c. p. 635, tab. IX, fig. 10, and Candèze, Histoire des mètam. de qlq. larves exotiques, tab. VI, fig. 8) and mine agreeing with them in all essential characters, it is not necessary to give here a detailed description. I will only mention that the antennæ are somewhat longer than those figured by Candèze (l. c. fig. 10) and that the fourth ocellus is extremely minute, so that there are, in fact only three distinct ocelli.

The larva is very common on the leaves of the pumpkin. It is yellow with long, brown, branched spines, arranged in rows of six on each segment, except the first thoracic segment, which has only four. The pupa, instead of spines, has short bristles, especially on the thorax.

UNKNOWN LARVÆ,

related to either of the groups of *Lampyridæ*, *Telephoridæ* and *Elateridæ*.

(Plate I. Fig. 8.)

Among the larvæ now before me for description, there are several unknown ones, belonging apparently to three distinct species of the same genus. One of the species, of which I have three specimens, comes from Louisiana and New Mexico. The second one (communicated to me by Dr. LeConte) is from Arizona. Both are from $2\frac{1}{2}$ to 3 inches long. The third species is represented by a single specimen, about an inch long, found by Dr. Horn in Pennsylvania.

The following is the description of the first of these species:—

Larva $2\frac{3}{4}$ inches long (one of the specimens, measuring only $1\frac{3}{4}$ inch is perhaps not full grown), linear, slightly attenuated at both ends, convex

on the back, flattened on the ventral side; glabrous, smooth and shining; consistence horny; color of the dorsal segments (thoracic and abdominal), except a narrow border on the posterior margin which is paler, dark brown, almost black, with two large, rounded, ferruginous-red spots on each; in two of my specimens (both from Prairie mer rouge), these spots, occupying the sides of the dorsal segments, leave a broad brown band between them; in the third specimen they are much larger, and although the brown space still exists on the thoracic segments, it becomes almost obsolete on the abdominal ones, where the two spots gradually coalesce towards the end of the body, so that the sixth and seventh abdominal segments may be described as being ferruginous above with a brown margin, running all round; on the ninth and last segment, the brown stripe is again more apparent, although the remainder of the segment, except the two anterior corners, is ferruginous. The anterior corners of the first thoracic segment are yellowish.

Head horizontal, inserted in the first thoracic segment as far as the basis of the antennæ, flat, irregularly rugose above, dark brown, except the softer parts of the mouth and tubercles bearing the antennæ, all of which are paler.

Antennæ a little shorter than the mandibles, inserted on a fleshy tubercle just behind the root of the latter, 3-jointed; first joint subcylindrical; second joint a little longer than the first, somewhat thickened towards the tip; third joint at least twice narrower than the tip of the second, not much longer than broad, ending in an obtuse point; its tip seems to be separated from it by an articulation, thus representing perhaps a rudimentary fourth segment; the two first segments are brown, their tip brownish-yellow; the tubercle, on which the antenna is inserted, as well as the third joint are brownish-yellow.

Ocelli one on each side, behind the basis of the antennæ.

The upper horny disc of the *head* is limited anteriorly, in the middle of the space between the roots of the mandibles, by a bisinuated margin, in the shape of a flat W, from each of the two sinuses of which protrudes a small, fleshy tubercle; just before the tubercles, and closely applied to both, is a similar fleshy, but paler and more transverse piece. Although the epistoma is not separated by a distinct suture, I am inclined to take either these three fleshy pieces, or the two first alone, for the labrum; in the latter case the third transverse piece would be merely a protruding soft inner part of the mouth.

Mandibles free (not covered by other parts of the mouth), falciform, elongated, narrow, slightly and uniformly curved, pointed at tip, perfectly

smooth (without any teeth or projections) on their whole length; with a longitudinal groove, running from the basis to the tip on their upper side; their roots far distant from each other, being inserted on the sides of the head; when in repose, these organs overlap each other on a considerable portion of their length, the left one being the uppermost in my specimens.

Maxillæ: no distinct cardinal piece; basal piece elongated, closely applied to the mentum and soldered to it on its lower portion; besides the palpus, each of them bears two palpiform appendages; one is close by the palpus, inside of it, and is better seen from above than from below the head; it does not reach beyond the tip of the first joint of the palpus and is apparently 2-jointed, the first joint being short and annuliform, the second cylindrical, stout, obtuse; at its tip there is a very minute tubercle, as if a rudimentary joint, on the inside, and a long bristle on the outside; the second appendage is inserted much deeper, inside of the maxilla; it is closely applied to the mentum and can be perceived only, when this organ is slightly removed from its usual position; it is very small, cylindrical and more slender than the first appendage, and consists of a single joint, inserted on a tubercle.

The palpi are rather long and stout, being but little shorter than the antennæ; they are 4-jointed, the two basal and the last joints being broader than long; the third is a little longer.

Mentum elongated, somewhat narrowed anteriorly, bearing a trapezoïdal palpigerous piece, which is narrowed at the base and has a small rounded projection on the inside, in the middle, especially distinct when seen from above; a bristle on each side of this projection and several bristles on the outside of the palpigerous piece, between the palpi; labial palpi consisting of two cylindrical, short joints; the second truncated at the tip.

The maxillæ and the palpigerous piece, with their palpi project considerably beyond the mandibles. The basal pieces of the mandibles and the mentum occupy the whole breadth of the underside of the head, their basis only being enclosed in the usual excision of the lower cephalic plate.

Prothorax trapezoïdal; slightly broader than the head anteriorly; almost twice as broad posteriorly; its upper disc being recurved on both sides, somewhat encroaches on the underside, where it is limited by a sharply defined edge. On the underside, a V-shaped groove separates a triangular piece covering the basal portion of the head (see fig. 8*b*).

The two following segments of the thorax are of about the same length, a little longer than the first; they are also trapezoïdal, but less narrowed anteriorly; their upper disc is also recurved on both sides, so as to encroach on the ventral segments.

The sculpture of the three thoracic segments consists of a very fine, umbilicated punctuation, which is chiefly apparent on the first segment and more scattered on the others. There is besides, a longitudinal impressed line, running along the middle of the back of the three segments, with slight interruptions at the incisures; this line is continued also, although less distinctly, along all the abdominal segments.

The feet: coxæ elongated, subcylindrical, inserted near the lateral margin and directed obliquely towards the middle, so as almost to touch with the tip, that of the opposite coxa; trochanters well developed, elongated; femora subcylindrical; tibiæ short, narrower than the femora, subcylindrical, bearing a curved, pointed nail at the tip. The feet of the last pair are larger than those of the two other pairs. All three pairs have numerous bristles on the underside; the femora have a crown of very short, strong spines round the tip, The thoracic stigma is placed on the ventral side of the mesothorax, in the anterior corners, close by the recurved margin of the upper disc.

The abdominal segments viewed from above, resemble in size and shape the second and third thoracic ones; they are perhaps a little longer, chiefly the sixth, seventh and eighth and the middle ones a little stouter; the ninth or last segment is shorter than the preceding, narrowed posteriorly. The eight pairs of stigmata are placed laterally on the dorsal side of the first eight segments, about the middle of a longitudinal furrow. Each ventral segment consists of three portions; the middle one is square, and but slightly convex; it has a rounded, conchoid depression in the middle, with fine longitudinal striæ at the bottom (this depression is wanting only on the last segment); the lateral portions, separated from the middle one by longitudinal furrows, are elongated, smooth. These lateral pieces, together with the corresponding pieces, cut off from the dorsal segments by the stigma-bearing furrows, form an uninterrupted margin on both sides of the larva. Except the dorsal impressed line and some hardly apparent rugosities, the dorsal segments of the abdomen are smooth and even.

The last segment ends in a short pseudopod, in the shape of a flattened tube, directed downwards, truncated at tip; its basal portion is black and horny, with a small projection on each side; the remainder is of a fleshy substance. The anal opening seems to be at the tip of this tube.

The larva from Arizona is easily distinguished from the former by its coloring. The dorsal segments are dark brown or black anteriorly and brownish-yellow posteriorly, the black occupying more than half the length of the segment. The second and third pairs of feet have *two* ungues instead of one, the second being smaller (in the other larva this second un-

guis may be also perceived as a mere rudiment). The teeth or projections on both sides of the horny portion of the pseudopod are larger than in the former species; they are curved and pointed (unguiform). In all other characters, this larva agrees with the former. Its length is about $2\frac{1}{2}$ inches.

The third species, communicated to me by Dr. Horn, was found under oak-bark, in a wet place. Although much smaller (it measures only 0.9), and of different color, it has exactly the same structure as the large larvæ, so as to make it appear very probable that it belongs to the same genus.

It is brownish-yellow; the middle portion of the dorsal segments is reddish-brown, thus leaving a yellowish margin; the pro- and mesothorax, as well as the last abdominal segment are reddish-brown. The venter shows none of the conchoid depressions of the large larvæ.

A specimen from Mississippi, similar to the latter in color and about an inch long, was communicated to Dr. LeConte by Prof. S. S. Haldeman, with the remark that it was luminous. Should this observation prove correct, it would not be surprising at all if the large larvæ were also luminous.

The points of relationship of these larvæ to the *Elateridæ*, *Lampyridæ* and *Telephoridæ* are evident; but the analogies to the two latter families prevail decidedly over those to the first. The mode of insertion of the head, the structure of the mandibles and maxillæ, the presence of an ocellus on each side, the form and position of the pseudopod, even the general appearance of the body are more like those of the *Lampyridæ*. Nevertheless the differences are obvious: the dorsal discs do not project on both sides over the ventral segments, the stigmata are placed on the sides of the body and not below, on the venter; the terminal joints of the palpi are stout and blunt, and not slender and pointed as in both *Lampyris* and *Telephorus*; the head, although inserted up to the root of the antennæ in the first thoracic segment, is not concealed by it, as in the *Lampyridæ*.

The analogies with the *Elateridæ* are hardly more than those also shared by the two other above named families; if there are any besides, they consist in the position of the stigmata and, perhaps, in the structure of the ventral side of the prothorax. But the differences are very considerable; our larvæ have neither the large head, entirely exserted from the prothorax, nor the peculiar structure of the basal pieces of the maxillæ and the labium which distinguish the *Elateridæ*. Besides they have a pair of ocelli, which are wanting in the latter, and the structure of the last abdominal segment with the pseudopod is totally different.

The mode of insertion of the mandibles of the larvæ of *Lycidæ*, they being approximated at the basis and divergent at the tip, at once excludes

our larvæ from this family.

Under such circumstances it is extremely difficult to form an hypothesis as to the insect to which these larvæ belong, however strange it may appear that such should be the case with larvæ nearly three inches long, and apparently so common.

Judging from the occurrence of large sized larvæ in the Southern States and of middle sized ones of the same genus in the Middle States, it becomes evident that this genus is represented by coleoptera at least an inch or an inch and a half long in the former and by smaller species in the latter. There being no such genus either among the *Lampyridæ* or *Telephoridæ*, or in their vicinity, we are compelled to look for it among the *Elateridæ*. This supposition, however improbable, is not entirely out of question since the discovery of the larvæ of *Cardiophorus* and *Cryptohypnus* has proved, that the type of Elaterideous larvæ is not so uniform, as it was formerly assumed. The genus *Melanactes* might perhaps answer the required conditions.

EXPLANATION OF THE PLATE.

FIG. 1. *Copris carolina*, nat. size; 1*a*, head, from above, with slightly opened mandibles; 1*b*, maxillæ and labium; 1*c*, maxilla.

FIG. 2. *Zenoa picea*, nat. size; 2*a*, maxillæ and labium.

FIG. 3. *Ptilodactyla elaterina*, magnified; 3*a*, maxilla; 3*b*, labium; 3*c*, antenna; 3*d*, underside of the head and of the anterior portion of prothorax.

FIG. 4. *Fornax badius*, magnified; 4*a*, head and two first thoracic segments, from above; *x* tip of maxilla (?); *xx* mandible (?); *y* place of insertion of the antenna (?).

FIG. 5. *Fornax orchesides* (?), nat. size; 5*a*, head and portion of prothorax, from below, magnified; *x* minute retractile organ, perhaps tip of maxilla (?); *xx* mandible (?).

FIG. 6. *Parandra brunnea* from above, nat. size; 6*a*, the same from below, magnified; 6*b*, head, from below.

FIG. 7. *Arhopalus pictus*, magnified, from above; 7*a*, from below; the two last abdominal segments were somewhat extended in the two specimens from which these figures were drawn; in most of the other specimens, they were like fig. 7*b*, where the last pair of stigmata may be seen on the eighth segment; 7*d*, mandibles; the upper figure represents the inner surface, the lower one, the profile.

FIG. 8. Unknown larva from Louisiana and New Mexico, nat. size; 8*a*, head and prothorax from above, magnified; 8*b*, the same, from below; 8*c*, mandible; 8*d*, tip of maxilla.